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# NATIONAL COMMUNICATIONS

# COMMUNICATIONS FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION

## Updated information on greenhouse gas emissions and projections

## Note by the secretariat

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# I. INTRODUCTION

## A. Mandate

1. The Subsidiary Body for Implementation (SBI), at its sixth session, requested the secretariat to submit, at its next session, a report on progress achieved so far in returning individually or jointly to their 1990 level anthropogenic emissions of $CO_2$ and other greenhouse gases not controlled by the Montreal Protocol and projected emissions by sources and removals by sinks of such gases in the year 2000 by each Annex I Party, on the basis of its national communication (FCCC/SBI/1997/16, paragraph 16 (f)).

## B. Scope of the note

2. The present note compiles the available numerical data on greenhouse gas inventories and projections drawn from both first and second national communications as well as from in-depth review reports and annual inventory submissions, where appropriate. It also contains graphs and charts presenting the numerical data in a visual way. In compiling the inventory information the secretariat has used for the aggregation and calculation of percentages the data for the latest available year, thus sometimes using 1994 data if 1995 data were not available. It was felt that this approach would not significantly affect the conclusions on the progress achieved so far. The projections for 2000 provided by Parties are not comparable and, in accordance with decision 2/CP.1 (FCCC/CP/1995/7/Add.1), national totals were not added.

## C. Possible action by the SBI

3. The SBI may wish to consider this note with a view to assessing the progress achieved so far by each Annex I Party in returning individually or jointly to their 1990 level anthropogenic emissions of $CO_2$ and other greenhouse gases not controlled by the Montreal Protocol and projected emissions by sources and removals by sinks of such gases in the year 2000. In doing so the SBI may also wish to take into consideration the first compilation and synthesis of second national communications (FCCC/SBI/1997/19 and Add.1).

# II. PRESENTATION OF RESULTS

4. Inventory data for 1990-1995 and projections for 2000 for individual Annex I Parties are presented in tables 1 to 5. Tables 1 to 3 contain information on the level of total emissions of the main GHGs (carbon dioxide, excluding the land-use change and forestry sector, methane ($CH_4$) and nitrous oxide ($N_2O$) in 1990 and the last reported year in mass units, the change in these emissions over the period 1991-1995 expressed in percentage relative to 1990, and the projected level for 2000 in both mass units and percentage relative to 1990 levels. Table 4 contains the same information on total emissions of all GHGs combined (expressed as $CO_2$ equivalent), excluding land-use change and forestry, while table 5 presents data on carbon dioxide emissions and removals from the land-use change and forestry sector, their impact on total national $CO_2$ emissions in 1990 and 1995, and projections for this sector for 2000 both in

mass units and percentage relative to the baseline level. Some tables are accompanied by charts illustrating information presented therein and providing additional information, on aspects such as the shares of some sectors in total emissions of the individual gases or changes in emissions of GHGs by sector for 1990-1995.

5. Inventory data on total $CO_2$ emissions, excluding the land-use change and forestry sector, (see table 1) indicate that for some Parties (Australia, Canada, Finland, Ireland, Japan, the Netherlands, Norway, the United States of America) there is a clear rising trend in the period 1990 to 1995. A number of Parties exhibit a declining trend (Germany, the United Kingdom and almost all the Parties with economies in transition), whereas for the remaining Parties there is no discernible trend with emissions fluctuating either above (Denmark, Iceland, New Zealand, Portugal, Sweden) or around the 1990 level (Austria, France, Switzerland). No information on trends could be presented for Greece, Italy, Luxembourg and Spain since their latest inventory data are still pending. Since for all Annex I Parties fuel combustion was the dominant source of $CO_2$ emissions in 1990 (about 97 per cent of total emissions originated from this source), it determined the overall change in these emissions in 1995 (or 1994) compared to 1990. Total $CO_2$ emissions for the 29 Annex I Parties which provided inventory information for the base year and 1995 (or 1994) taken together decreased from 1990 to 1995 by 4.6 per cent.

6. The relative contributions of the 29 Parties for which the latest inventory data were available, to the change in total $CO_2$ emissions from these Parties taken together are presented in figure 1. The figure indicates shares (in percentage) of Parties for which $CO_2$ emissions were lower/higher in 1995 than in 1990, in the total decrease/increase of these emissions in 1990-1995; the total decrease and total increase were taken separately as 100 per cent each. The figure indicates that the overall reduction is mainly due to the contributions from Germany, Poland and the Russian Federation, which together accounted for more than 85 per cent of the decrease in total $CO_2$ emissions; the remaining Parties with decreased emissions each had a share of less than 4 per cent. The bulk of the increase is due to Canada, Japan and the United States of America, which together accounted for 85 per cent, the remaining Parties with increased emissions each having a share of less than 4 per cent.

7. As can be seen from table 1 and accompanying charts, 15 Parties (Australia, Belgium, Canada, Finland, France, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, the United States of America) projected an increase in $CO_2$ emissions in 2000 compared to 1990 levels, the increases ranging from 3-4 per cent (France and Sweden) to 22-26 per cent (Iceland, New Zealand, Norway, Spain). Twelve Parties projected a stabilization or decrease of these emissions for 2000; among these were Austria, Denmark, Germany, Luxembourg, the Netherlands, Switzerland and the United Kingdom as well as seven Parties with economies in transition. Projected increases or decreases of $CO_2$ emissions for 2000 in mass units relative to 1990 can be seen in figure 2.

8. A comparison of inventory data with projections gives an estimate of the consistency of the trend with the level of $CO_2$ emissions projected for 2000 (see table 1 and accompanying chart). For those Parties which projected an increase, the projections seem to be consistent with

the inventory data, although Canada's emissions already reached in 1995 the level projected for 2000 and in Japan emissions in 1995 were almost 6 per cent higher than projected for 2000. Projected decreases are consistent with the actual trends in emissions for Parties with economies in transition as well as for Germany and the United Kingdom. The trends for Luxembourg and Switzerland are not inconsistent with the projected reduction in 2000, whereas the developments seem to be more challenging for Denmark and the Netherlands.

9. Total methane emissions decreased in 1995 compared to 1990 by almost 4 per cent for reporting Annex I Parties as a whole. $CH_4$ emissions from fuel combustion decreased in this period by 10 per cent, fugitive fuel emissions by 8 per cent and emissions from agriculture by 4 per cent, whereas methane emissions from waste increased by 6 per cent.

10. Total $CH_4$ emissions in 1995 were below or at the 1990 level in the majority of Annex I Parties. Only Canada, Norway and the United States of America reported an increase of 17, 9 and 5 per cent, respectively. The majority of Parties, including Norway and the United States of America, project a decrease or stabilization in $CH_4$ emissions in 2000, whereas Australia, Austria, Canada, Ireland and Luxembourg project an increase ranging from 2 per cent for Austria to 13 per cent for Canada. The projections for methane seem to be generally consistent with the inventory data for 1990-1995 (see table 2 and accompanying graphs).

11. Emissions of nitrous oxide also decreased from 1990 to 1995 for the group of Annex I Parties; this decrease amounted to almost 5 per cent, with $N_2O$ emissions from industrial processes and agriculture declining by 8 and 12 per cent, respectively, and emissions from fuel combustion (transport) increasing by 11 per cent. An increasing trend is discernible in the period 1990-1995 for Austria, Canada, Denmark, Japan, Luxembourg, the Netherlands and the United States of America. After and initial decline $N_2O$ emissions started to grow in the Czech Republic, Hungary and Slovakia; the remaining Parties with economies in transition exhibited a declining trend. In Australia, Finland, France, Germany, Iceland, Ireland, New Zealand, Norway, Sweden and Switzerland these emissions fluctuated below or at the 1990 level, whereas in Belgium and Portugal they fluctuated above the 1990 level.

12. The majority of Parties (16 of them) projected for 2000 a stabilization or decrease in $N_2O$ emissions, whereas ten Parties projected an increase. Some Parties did not provide projections for nitrous oxide emissions. Projections for 2000 seem to be generally consistent with the trends for 1990-1995, although it may be noted that Canada, the Netherlands and the United States of America, which projected near-stabilization or decrease for 2000 compared to 1990, already have $N_2O$ emissions higher in 1995 than in 1990 (see table 3 and accompanying graphs).

13. Inventory information on other gases, especially on the "new gases" - hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride ($SF_6$) - was less consistent and uniform than for the main GHGs thus preventing the secretariat from presenting information on their trends in 1990-1995. Parties that provided HFC projections for 2000 (Canada, Germany, Finland, Iceland, Norway, New Zealand, Sweden and the United Kingdom) expect a significant increase in these emissions because of the growing use of HFCs as replacements for

ozone-depleting substances. Emissions of PFCs are projected to decrease in Germany, Iceland, Norway, New Zealand and the United Kingdom and increase in Canada, Finland, the Netherlands and Sweden. As for $SF_6$ emissions, Germany, Finland, Iceland, New Zealand and the United Kingdom projected an increase and Canada and Norway a decrease. The United States of America projected an increase in emissions of these "new GHGs" as a whole expressed in $CO_2$ equivalent.

14. Total anthropogenic emissions of all GHGs, excluding the land-use change and forestry sector, in the period 1990-1995 generally exhibited trends similar to those for $CO_2$ emissions, which is explained by the fact that $CO_2$ emissions constituted the largest share (more than 80 per cent) of all GHGs. The same is true for projections for 2000, where 14 Parties (Australia, Belgium, Canada, Finland, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden and the United States of America) projected an increase (based on unadjusted figures) and twelve Parties (Bulgaria, the Czech Republic, Denmark, France, Germany, Hungary, Latvia, Luxembourg, Poland, Slovakia, Switzerland and the United Kingdom) a decrease (see table 4 and accompanying charts). For six Parties (Austria, Estonia, Portugal, Romania, the Russian Federation and Spain) projections are not presented here since these Parties did not provide projections for all main GHGs.

15. Table 5 contains inventory information on the land-use change and forestry sector for 1990 and 1995 as well as the relative impact of this sector on national $CO_2$ totals and projected emissions or removals for 2000. As can be seen from the table, this sector was a net sink for the majority of Parties and thus in some cases could have a major impact on national totals if removals of $CO_2$ were subtracted from emissions. Nevertheless, the data presented in table 5 should be treated with caution since inventory data for the land-use change and forestry sector were reported to have a medium level of confidence at best and methodologies used by individual Parties varied widely. For these reasons the aggregation of data on emissions or removals and their year-by-year comparisons were not feasible.

16. Twenty Parties reported projections in the land-use change and forestry sector. For 18 Parties this sector was projected to remain a net sink, but for Australia and the United Kingdom it was projected to remain a net source, although a smaller one. For 11 Parties (Bulgaria, the Czech Republic, France, Ireland, Italy, Japan, the Netherlands, Slovakia, Spain, Switzerland, the United States of America) net $CO_2$ removals by the land-use change and forestry category were projected to increase, and for five (Finland, Latvia, Norway, New Zealand, Sweden) to decrease. Two Parties (Belgium, Denmark) projected removals to remain stable.

## III. CONCLUSIONS

17. Inventory data for Parties for which aggregation was feasible, indicate that in the period from 1990 to 1995 anthropogenic emissions of carbon dioxide, methane and nitrous oxide for these Parties *taken together* each decreased by 4 to 5 per cent. In the case of $CO_2$, the dominant greenhouse gas, the decrease was largely due to declines in a few Parties offseting increases in other Parties. It should be noted that some Annex I Parties have yet to submit their inventory data for 1990-1995. For this reason the resulting figure for the change in emissions for *all* Annex I Parties taken together may be different.

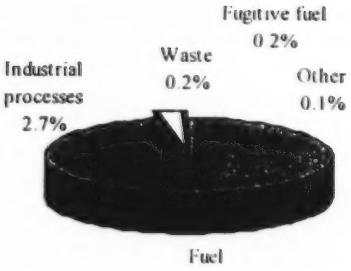
18. A comparison of projections for 2000 with inventories for the base year and the latest reported year suggests that, for about half of Annex I Parties, additional measures would be needed to return $CO_2$ and/or all GHG emissions to their 1990 level by 2000. Although the projections provided by Parties were not comparable and thus national projection figures could not be added, they nevertheless indicate that the ratio of projected total increase to projected total decrease is about 1.7:1, suggesting that $CO_2$ emissions in 2000 may be higher than in 1990. The return to 1990 levels is more likely for methane and nitrous oxide for the majority of Annex I Parties. The emissions of other GHGs are expected to grow significantly in absolute terms, although their relative contribution to total GHG emissions is projected for 2000 to be less than that of $N_2O$ for most Parties.

**Table 1. Total anthropogenic $CO_2$ emissions, excluding land-use change and forestry, 1990 - 1995, and projections for 2000 (Gigagrams and percentage)**

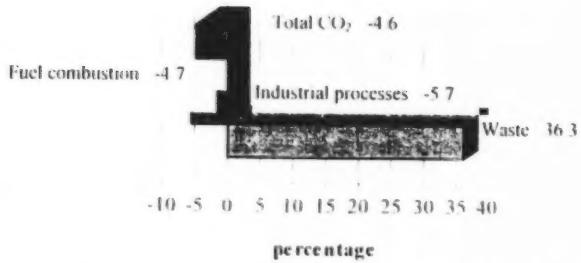
| | | | Percentage relative to 1990, 1990=100 | | | | | Projections | |
|---|---|---|---|---|---|---|---|---|---|
| | 1990 | Last Reported Value | 1991 | 1992 | 1993 | 1994 | 1995 | 2000 | percentage change from baseline |
| | (Gg) | (Gg) | % | % | % | % | % | (Gg) | (%) |
| Australia | 273 123 | 285 501 | 101 | 102 | 103 | 105 | | 332 799 | 15 1 |
| Austria | 61 880 | 62 020 | 107 | 97 | 96 | 96 | 100 | 57 300 | -7 |
| Belgium | 116 090 | 121 297 | 103 | 102 | 99 | 104 | | 125 200 | 8 |
| Bulgaria | 96 878 | 57 764 | 67 | 61 | 63 | 60 | | 69859 | -27 9 |
| Canada | 464 000 | 499 526 | 98 | 101 | 101 | 104 | 108 | 500 600 | 8 |
| Czech Republic | 165 490 | 128 817 | 93 | 85 | 81 | 77 | 78 | 139 000 | -17 |
| Denmark | 52 025 | 62 132 | 121 | 110 | 114 | 121 | | 53 753 | -7 9 |
| Estonia | 37 797 | 21 628 | 97 | 73 | 55 | 57 | | 17 500 - 23000 | (-53 7)-(-39 2) |
| Finlanda | 53 800 | 56 050 | | 97 | 99 | 110 | 104 | (58 000 - 60 000) | (8 - 12) |
| France | 378 379 | 385 347 | 106 | 106 | 99 | 99 | 102 | 397 833 | 3 8 |
| Germany | 1 014 155 | 894 500 | 96 | 91 | 91 | 89 | 88 | 894 000 | -12 |
| Greece | 82 100 | | | | | | | 94 500 | 15 1 |
| Hungary | 83 676 | 59 196 | 81 | 72 | 73 | 71 | | 69741 | -15 7 |
| Iceland | 2 147 | 2 282 | 96 | 102 | 107 | 105 | 106 | 2 697 | 26 |
| Ireland | 30 719 | 33 931 | 103 | 105 | 104 | 108 | 110 | 34 998 | 14 |
| Italy | 428 941 | | | | | | | 482 440 | 13 8 |
| Japan | 1 124 532 | 1 218 377 | 102 | 103 | 101 | 108 | 108 | 1 200 000 | 2 3 |
| Latvia | 22 976 | | | | | | 49 | 16 956 | -26 2 |
| Luxembourg | 13 188 | 12 661 | | | | 96 | | 7 556 | -42 8 |
| Monaco[b] | 71 | 129 | | | | | | | |
| Netherlands | 167 550 | 183 400 | 104 | 103 | 105 | 105 | 109 | 173 500 | 4 0 |
| New Zealand | 25 476 | 27 367 | 102 | 110 | 107 | 107 | 107 | 31 080 | 22 |
| Norway | 35 544 | 37 880 | 95 | 97 | 101 | 106 | 107 | 44 000 | 22 |
| Poland | 478 880 | 371588 | 83 | 78 | | 78 | | 338 000 - 455 000 | (-26 2) - (-0 7) |
| Portugal | 42 148 | 46 212 | 106 | 118 | 112 | 110 | | 54 274 | 40 3 |
| Romania | 198 479 | | 71 | 62 | 61 | | | | |
| Russian Federation | 2 375 591 | 1 633 517 | | | | 69 | | 1 930 000 - 2 026 000 | (-17 2)-(-13 0) |
| Slovakia | 60 032 | 48 516 | 88 | 81 | 77 | 72 | 81 | (44 780 - 46 178) | (-25)-(-23) |
| Spain | 227 322 | | | | | | | 276 523 | 24 1 |
| Sweden | 55 445 | 58 108 | 100 | 101 | 101 | 106 | 105 | 60 100 | 3 |
| Switzerland | 45 070 | 44 170 | 104 | 101 | 98 | 96 | 98 | 43 900 | -7 |
| United Kingdom | 583 747 | 543 338 | 101 | 98 | 95 | 95 | 93 | 550 000 | -5 |
| United States | 4 960 432 | 5 214 710 | 99 | 100 | 103 | 104 | 105 | 5 627 310 | 11 |

[a] Party did not provide estimate for 1991

[b] As Party did not provide estimate for 1995, but for 1996, this estimate is given in the table The trend in emissions is not given here since the estimate for 1990 includes only emissions from waste while the estimate for 1995 includes emissions from waste and fuel combustion




**Shares of the main sources in total CO2 emissions, 1990**




**Change in $CO_2$ emissions by sector, 1995 relative to 1990.**

**Total CO2 emissions (excluding land-use change and forestry) in 1995 and projections for 2000, percentage relative to 1990**

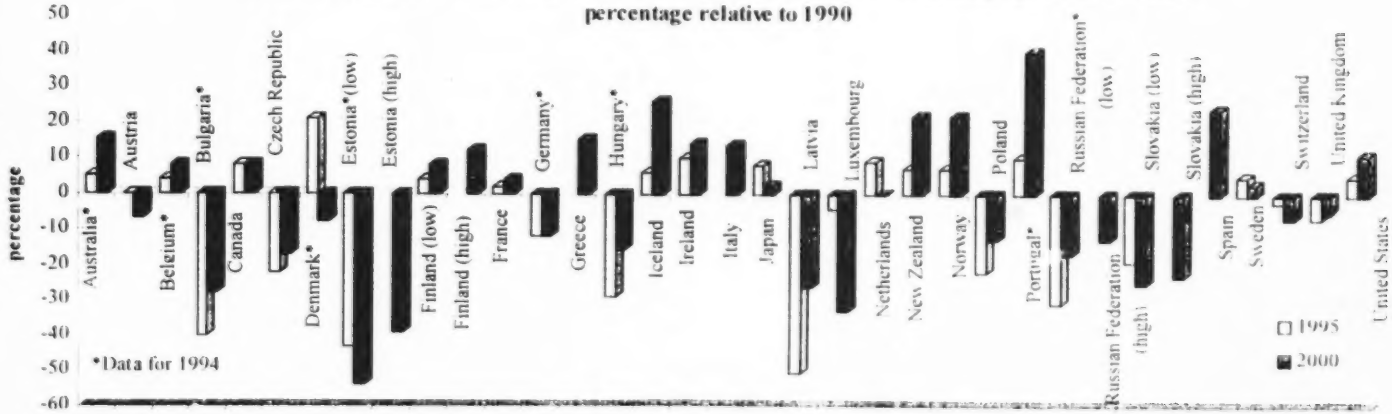


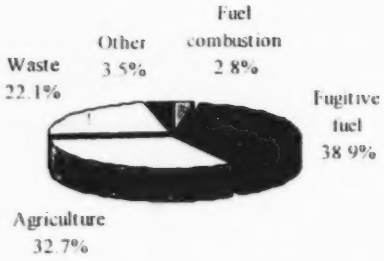
**Table 2. Total anthropogenic $CH_4$ emissions, 1990 - 1995, and projections for 2000 (Gigagrams and percentage)**

| | | | Percentage relative to 1990, 1990=100 | | | | | Projections | |
|---|---|---|---|---|---|---|---|---|---|
| | 1990 | Last Reported Value | 1991 | 1992 | 1993 | 1994 | 1995 | 2000 | percentage change from baseline |
| | (Gg) | (Gg) | % | % | % | % | % | (Gg) | (%) |
| Australia | 5 590 | 5 302 | 95 | 95 | 95 | 95 | | 6 480 | 3 8 |
| Austria | 587 | 580 | 98 | 98 | 98 | 99 | 99 | 600 | 2 |
| Belgium | 634 | 635 | 99 | 99 | 100 | 100 | | 530 | -15 |
| Bulgaria (1988) | 1 413 | | 94 | 87 | 79 | 76 | | 1057 | -5 5 |
| Canada | 3 200 | 3 732 | 100 | 103 | 109 | 113 | 117 | 3 456 | 13 |
| Czech Republic | 888 | 733 | 92 | 87 | 82 | 80 | 83 | 742 | -16 |
| Denmark | 407 | 401 | 100 | 100 | 100 | 99 | | 354 | -12 8 |
| Estonia | 323 | 188 | 89 | 70 | 56 | 58 | | | |
| Finland[a] | 246 | 241 | | 100 | 99 | 100 | 98 | 226 | -8 |
| France | 3 017 | 2 844 | 100 | 97 | 97 | 95 | 94 | 2 900 | 0 |
| Germany | 5 682 | 4 849 | 92 | 91 | 88 | 85 | | 3 892 | -32 |
| Greece | 343 | | | | | | | < 343 | < 0 0 |
| Hungary[b] (1985-87) | 664 | 776 | | | | | | 218 | -54 |
| Iceland | 14 | 14 | 99 | 98 | 98 | 99 | 97 | 13 5 | -4 |
| Ireland | 811 | 812 | 98 | 99 | 99 | 99 | 100 | 837 | 3 |
| Italy | 3 901 | | | | | | | 2 965 | -24 0 |
| Japan | 1 575 | 1 548 | 99 | 99 | 99 | 98 | | 1 150 | -16 7 |
| Latvia | 159 | | | | | | 65 | 114 | -28 2 |
| Luxembourg | 25 | 23 | | | | 92 | | 26 | 6 1 |
| Monaco[c] | | | | | | | | | |
| Netherlands | 1 104 | 1 063 | 102 | 98 | 97 | 97 | 96 | 788 | -34 |
| New Zealand | 1 706 | 1 635 | 98 | 95 | 93 | 95 | 96 | 1 541 | -10 |
| Norway | 432 | 469 | 100 | 101 | 104 | 108 | 109 | 414 | -4 |
| Poland (1988) | 3 042 | 2472 | | 81 | | 81 | | 1780 | -11 |
| Portugal | 227 | 225 | 100 | 100 | 100 | 99 | | | |
| Romania (1989) | 2 328 | | 74 | 65 | 65 | | | | |
| Russian Federation | 26 690 | 23 880 | | | | 89 | | | |
| Slovakia | 409 | 316 | 93 | 88 | 81 | 77 | 77 | 251 - 401 | (-37)-0 |
| Spain | 2 151 | | | | | | | | |
| Sweden | 324 | 296 | 99 | 99 | 99 | 94 | 91 | 284 | -6 |
| Switzerland | 244 | 235 | 100 | 99 | 99 | 97 | 97 | 229 | -6 |
| United Kingdom | 4 464 | 3 817 | 99 | 98 | 91 | 86 | 86 | 3 418 | -22 |
| United States | 29 578 | 30 975 | 101 | 102 | 101 | 104 | 105 | 26 186 | -11 |

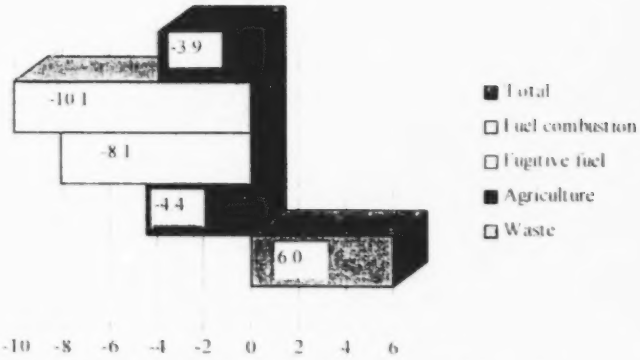
[a] Party did not provide estimate for 1991

[b] The trend in emissions is not shown here since the estimates for energy-related emissions for the base year were not fully consistent with estimates for 1991-1994 and estimates for emissions from waste were only reported for 1991-1994. Likewise, the emissions for 1994 and projections for 2000 are not presented in the graph below for these reasons

[c] Party did not provide estimates but indicated that emissions were negligible




**Shares of main sources in total $CH_4$ emissions, 1990**




**Changes in $CH_4$ emissions by sector, 1995 relative to 1990, per cent**

**Total CH4 emissions in 1995 and projections for 2000, percentage relative to 1990**

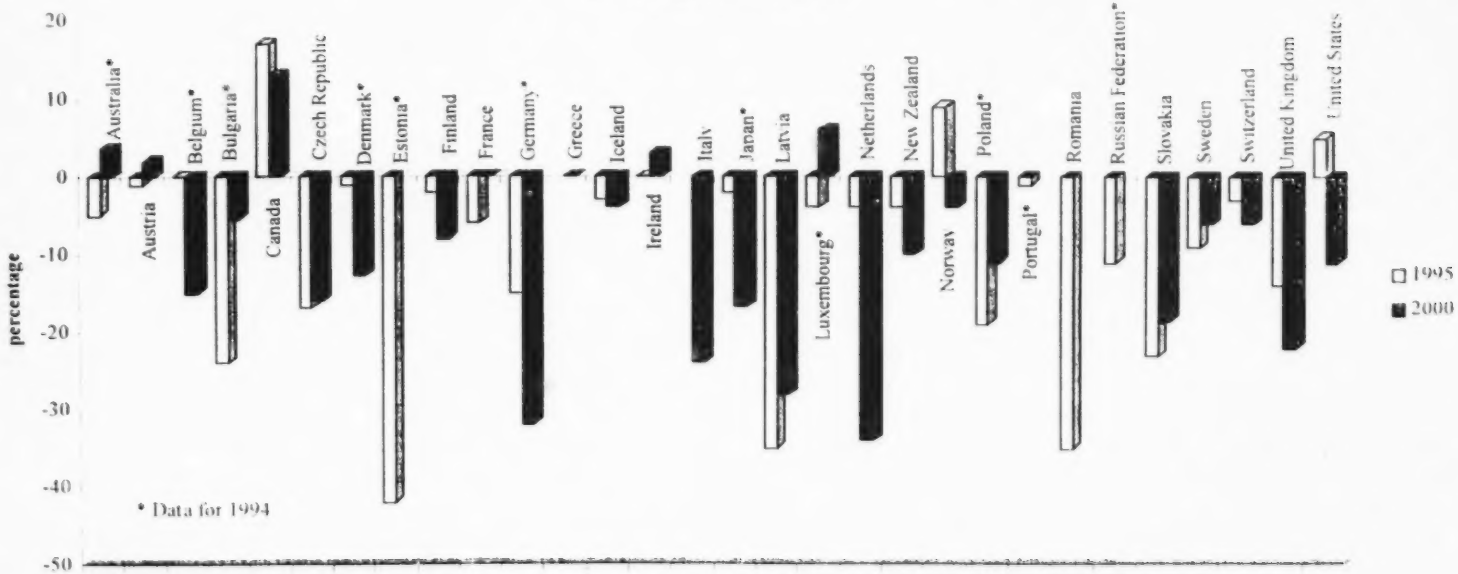
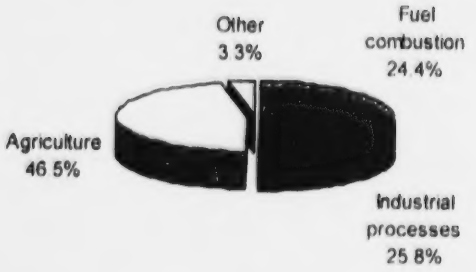


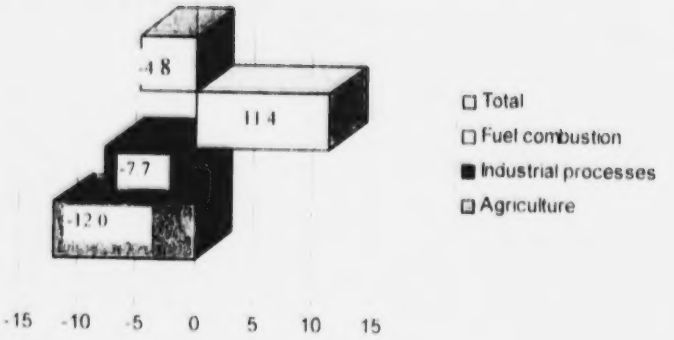
**Table 3. Total anthropogenic $N_2O$ emissions, 1990 - 1995, and projections for 2000 (Gigagrams and percentage)**

| | | | Percentage relative to 1990, 1990=100 | | | | | Projections | |
|---|---|---|---|---|---|---|---|---|---|
| | 1990 | Last Reported Value | 1991 | 1992 | 1993 | 1994 | 1995 | 2000 | percentage change from baseline |
| | (Gg) | (Gg) | % | % | % | % | % | (Gg) | % |
| Australia | 81.2 | 81.6 | 98 | 98 | 100 | 100 | | 61.1 | 1.5 |
| Austria | 11.6 | 12.8 | 104 | 105 | 106 | 109 | 110 | | |
| Belgium | 30.8 | 32.3 | 100 | 97 | 99 | 105 | | 30.4 | 9 |
| Bulgaria | 30.8 | 18.0 | 75 | 63 | 57 | 58 | | 16.3 | -47 |
| Canada | 86.0 | 107.8 | 101 | 107 | 109 | 116 | 125 | 74.0 | -14 |
| Czech Republic | 25.8 | 21.6 | 91 | 87 | 82 | 83 | 84 | 22 | -12 |
| Denmark | 10.3 | 10.9 | 104 | 103 | 105 | 106 | | 11.5 | 9.5 |
| Estonia | 2.4 | 1.3 | 98 | 77 | 60 | 55 | | | |
| Finland [a] | 18.0 | 18.0 | | 94 | 100 | 100 | 100 | 21.5 | 19 |
| France | 181.7 | 173.5 | 99 | 96 | 90 | 93 | 95 | 93.0 | -47.0 |
| Germany | 226.0 | 219.0 | 97 | 100 | 96 | 97 | | 162.0 | -28 |
| Greece | 13.7 | | | | | | | 13.7 | 0.0 |
| Hungary | 12.9 | 8.2 | 58 | 56 | 53 | 63 | | 6.2 | -26 |
| Iceland | 0.4 | 0.4 | 95 | 90 | 88 | 88 | 95 | 0.5 | 25 |
| Ireland | 29.4 | 26.0 | 86 | 87 | 87 | 88 | 89 | 26.0 | -12 |
| Italy | 120.3 | | | | | | | 123.6 | 3.5 |
| Japan | 105.3 | 110.0 | 103 | 101 | 102 | 104 | | 52.0 | 83 |
| Latvia | 2.4 | | | | | | 28 | 1.4 | -41.6 |
| Luxembourg | 0.7 | 0.9 | | | | 133 | | 0.7 | 0 |
| Monaco [b] | | | | | | | | | |
| Netherlands | 51.2 | 58.5 | 104 | 111 | 112 | 113 | 114 | 65.2 | 4 |
| New Zealand | 47.5 | 46.7 | 96 | 97 | 97 | 97 | 98 | 46.0 | -3 |
| Norway | 15.0 | 14.0 | 100 | 87 | 93 | 93 | 93 | 16.0 | 5 |
| Poland | 58.9 | 50.0 | | 85 | | 85 | | 61.8 | 4 |
| Portugal | 10.6 | 10.9 | 105 | 111 | 106 | 103 | | | |
| Romania | 122.7 | | 74 | 56 | 80 | | | | |
| Russian Federation | 228.0 | 134.5 | | | | 59 | | | |
| Slovakia | 12.5 | 7.8 | 87 | 72 | 57 | 58 | 62 | 6.8 - 10.6 | (-37)-(-3) |
| Spain | 93.9 | | | | | | | | |
| Sweden | 9.2 | 9.2 | 100 | 96 | 100 | 103 | 100 | 10.8 | 13 |
| Switzerland | 11.5 | 11.8 | 101 | 102 | 103 | 103 | 103 | 11.7 | 2 |
| United Kingdom | 120.0 | 95.0 | 95 | 81 | 73 | 83 | 79 | 42.9 | -62 |
| United States | 425.0 | 467.0 | 100 | 102 | 106 | 108 | 110 | 367 | -14 |

[a] Party did not provide estimate for 1991
[b] Party did not provide estimates but indicated that emissions were negligible




**Shares of main sources in total $N_2O$ emissions, 1990**




**Change in $N_2O$ emissions by sector, 1995 relative to 1990, per cent**

**Total N2O emissions in 1995 and projections for 2000, percentage relative to 1990**

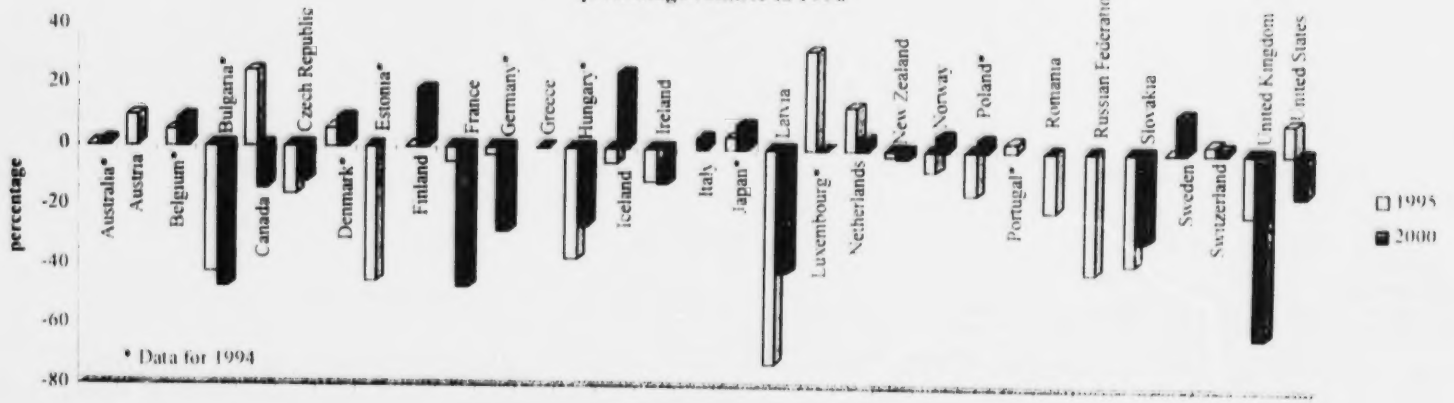


**Table 4. Total anthropogenic emissions of all greenhouse gases[a], excluding land-use change and forestry, 1990 - 1995, and projections[b] for 2000 (Gigagrams of $CO_2$ equivalent and percentage)**

| | 1990 | Last reported value | Percentage relative to 1990, 1990=100 | | | | | Projections | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1991 | 1992 | 1993 | 1994 | 1995 | 2000 | percentage change from baseline |
| | (Gg) | (Gg) | % | % | % | % | % | (Gg) | % |
| Australia | 420 521 | 424 241 | 99 | 99 | 100 | 101 | | 512 811 | 10 0 |
| Austria | 77 814 | 78 173 | 106 | 98 | 97 | 98 | 100 | | |
| Belgium | 138 943 | 145 522 | 102 | 102 | 100 | 105 | | 145 754 | 6 |
| Bulgaria (1988) | 136 099 | 85 870 | 73 | 67 | 66 | 63 | | 101 011 | -22 |
| Canada | 566 664 | 619 726 | 98 | 101 | 103 | 105 | 109 | 609 118 | 8 |
| Czech Republic | 192 130 | 150 913 | 92 | 85 | 82 | 78 | 79 | 161 402 | -17 |
| Denmark | 63 974 | 74 924 | 117 | 108 | 111 | 117 | | 66 106 | -8 0 |
| Estonia | 45 309 | 25 969 | 96 | 73 | 55 | 57 | | | |
| Finland | 64 546 | 66 691 | | 97 | 99 | 108 | 103 | 69 660 | 9 |
| France[c] | 498 067 | 498 855 | 104 | 104 | 98 | 97 | 100 | 498 643 | -2 0 |
| Germany | 1 210 387 | 1 070 691 | 96 | 92 | 91 | 90 | 88 | 1 038 058 | -14 |
| Greece | 93 550 | | | | | | | 107 288 | 13 0 |
| Hungary[d] (1985-87) | 101 619 | 78 039 | | | | | | 77536 | -22 |
| Iceland | 2 883 | 2 765 | 95 | 94 | 96 | 95 | 96 | 3 250 | 27 |
| Ireland | 56 861 | 59 060 | 99 | 100 | 100 | 103 | 104 | 60 625 | 7 |
| Italy | 548 259 | | | | | | | 597 200 | 7 0 |
| Japan | 1 235 986 | 1 347 200 | 102 | 104 | 103 | 109 | | 1 244 815 | 2 0 |
| Latvia | 27 059 | 13 637 | | | | | 50 | 20 197 | -27 0 |
| Luxembourg | 13919 | 13423 | | | | 96 | | 8 417 | -30 0 |
| Monaco | | | | | | | | | |
| Netherlands | 215 357 | 236 154 | 99 | 99 | 104 | 105 | 110 | 219 160 | -2 |
| New Zealand | 77 188 | 80 913 | 99 | 100 | 99 | 104 | 105 | 83 ?11 | 8 |
| Norway | 54 011 | 54 328 | 96 | 93 | 96 | 101 | 101 | 60 279 | 11 |
| Poland (1988) | 561 021 | 439 000 | 71 | 78 | | 78 | | 401 386 - 281 386 | (-36) - (-18) |
| Portugal | 50 195 | 54 314 | 105 | 116 | 110 | 108 | | | |
| Romania (1989) | 285 404 | | 72 | 62 | 64 | | | | |
| Russian Federation | 3 006 761 | 2 176 692 | | | | 72 | | | |
| Slovakia | 72 995 | 57 891 | 89 | 82 | 77 | 72 | 79 | 55 840 | -24 |
| Spain | 301 602 | | | | | | | | |
| Sweden | 66 457 | 69 004 | 97 | 101 | 100 | 105 | 104 | 71 447 | 5 |
| Switzerland | 53 749 | 53 806 | 103 | 101 | 98 | 97 | 100 | 52 336 | -6 |
| United Kingdom | 718 764 | 656 872 | 100 | 97 | 94 | 93 | 91 | 639 072 | -10 |
| United States | 5 801 400 | 6 146 624 | 99 | 101 | 103 | 105 | 106 | 6 444 828 | 11 |

[a] Aggregated emissions of $CO_2$, $CH_4$, $N_2O$, and where reported HFCs, PFCs, $SF_6$, using IPCC 1995 global warming potentials

[b] For consistency, the data are presented for those Parties which provided projections for at least three main GHGs

[c] As Party only reported emissions of HFCs, PFCs and $SF_6$ for 1990 and not subsequent years, these emissions have not been included in this table for comparison and consistency purposes

[d] The trend in emissions is not shown here since the estimates for energy-related emissions for the base year were not fully consistent with estimates for 1991-1994 and estimates for emissions from waste were only reported for 1991-1994

**Shares of individual gases in total GHG emissions, 1990**




**Total emissions of all GHGs in 1995 and projections for 2000, percentage relative to 1990**

**Table 5. Anthropogenic $CO_2$ emissions and removals[a] from land-use change and forestry and impact on total $CO_2$ emissions, 1990 & 1995, and projections for 2000 (Gigagrams and percentage)**

| | Land-use change and forestry, net emissions or removals | | Percentage reduction or increase (-/+) of national $CO_2$ emissions taking into account land-use change and forestry | | Projections | |
|---|---|---|---|---|---|---|
| | 1990 | Last reported year | 1990 | Last reported year | 2000 | percentage change from baseline[b] |
| | (Gg) | (Gg) | % | % | (Gg) | (%) |
| Australia[c] | 121 688 | -27 512 | 45 | -10 | 121 992 | -6 8 |
| Austria | -13 300 | -13 580 | -21 | -22 | | |
| Belgium[d] | -2 057 | -2 057 | -2 | -2 | -2 057 | 0 |
| Bulgaria (1988) | -4 657 | -6 941 | -5 | -12 | -5 801 | 0 |
| Canada[e] | | | | | | |
| Czech Republic | -2 281 | -5 454 | -1 | -4 | -5 000 | -250 |
| Denmark | -2 600 | | -5 | | -2 600 | 0 |
| Estonia | 1 796 | 1 646 | 5 | 8 | | |
| Finland[f] | (-30 000)- (-19 000) | (-14 000) - (-7 000) | (-56) - (-35) | (-22) - (-12) | (-12 000) - (-17 000) | (62)-(46) |
| France | -33 218 | -46 801 | -9 | -12 | -39 000 | -21 8 |
| Germany | -30 000 | -30 000 | -3 | -3 | | |
| Greece | | | | | | |
| Hungary (1985-87) | -3 097 | -4 820 | -4 | -8 | | |
| Iceland[g] | | | | | | |
| Ireland | -5 160 | -6 230 | -17 | -18 | -7 580 | -47 |
| Italy | -36 730 | | -9 | | -46 730 | -27 2 |
| Japan | -83 341 | -94 619 | -7 | -8 | -92 000 | -2 2 |
| Latvia | -14 300 | -15 831 | -62 | -141 | -8 940 | 37 5 |
| Luxembourg | | | | | | |
| Netherlands | -1 500 | -1 700 | -1 | -1 | -1 700 | -13 |
| New Zealand | -20 569 | -13 487 | -81 | -59 | -18 944 | -8 |
| Norway | -10 200 | -13 637 | -29 | -36 | -11 000 | 17 |
| Poland (1988) | -1 408 | -43 861 | 0 | -12 | | |
| Portugal | | | | | | |
| Romania (1989) | -2 925 | | -1 | | | |
| Russian Federation | -392 690 | -568 850 | -17 | -35 | | |
| Slovakia | -4 257 | -5 116 | -7 | -11 | -5 227 | -24 |
| Spain | -23 166 | | -10 | | -25 700 | -10 9 |
| Sweden[h] | -34 368 | -30 000 | -62 | -54 | -29 000 | 15 |
| Switzerland | -4 360 | -5 100 | -10 | -12 | -5 100 | -17 |
| United Kingdom[i] | 18 776 | 9 945 | 3 | 2 | 11 100 | -46 |
| United States | -458 000 | -428 000 | -9 | -8 | -411 040 | 10 4 |

[a] Negative values in Gg denote removal of $CO_2$. Positive values denote a net source of emissions

[b] Negative value in percentage denotes a larger removal in 2000 than the base year, or a decrease in net emissions

[c] The 1990 estimate includes emissions from forest and grassland conversion of 152,062 Gg. Emissions from forest and grassland conversion were not estimate for the last reported year

[d] As estimates for 1995 were not available, estimates for the last reported year, 1994, are given in this table

[e] The Party was not able to provide estimates in the manner provided for in the IPCC Guidelines, however did include in its national communication a detailed description of the model used for estimation of the carbon fluxes in its forests

[f] A range of estimates of emissions from cultivated peatlands and non-viable drainage areas were included, thus a range for the total estimates from land-use change and forestry are given in this table

[g] The Party did not provide any official estimates, however did include in its national communication a description of the ongoing activities and preliminary estimates from the sector

[h] As estimates for 1995 were not available, estimates for the last reported year, 1992, are given in this table

[i] The estimates include emissions and removals from wetland drainage and peat extraction

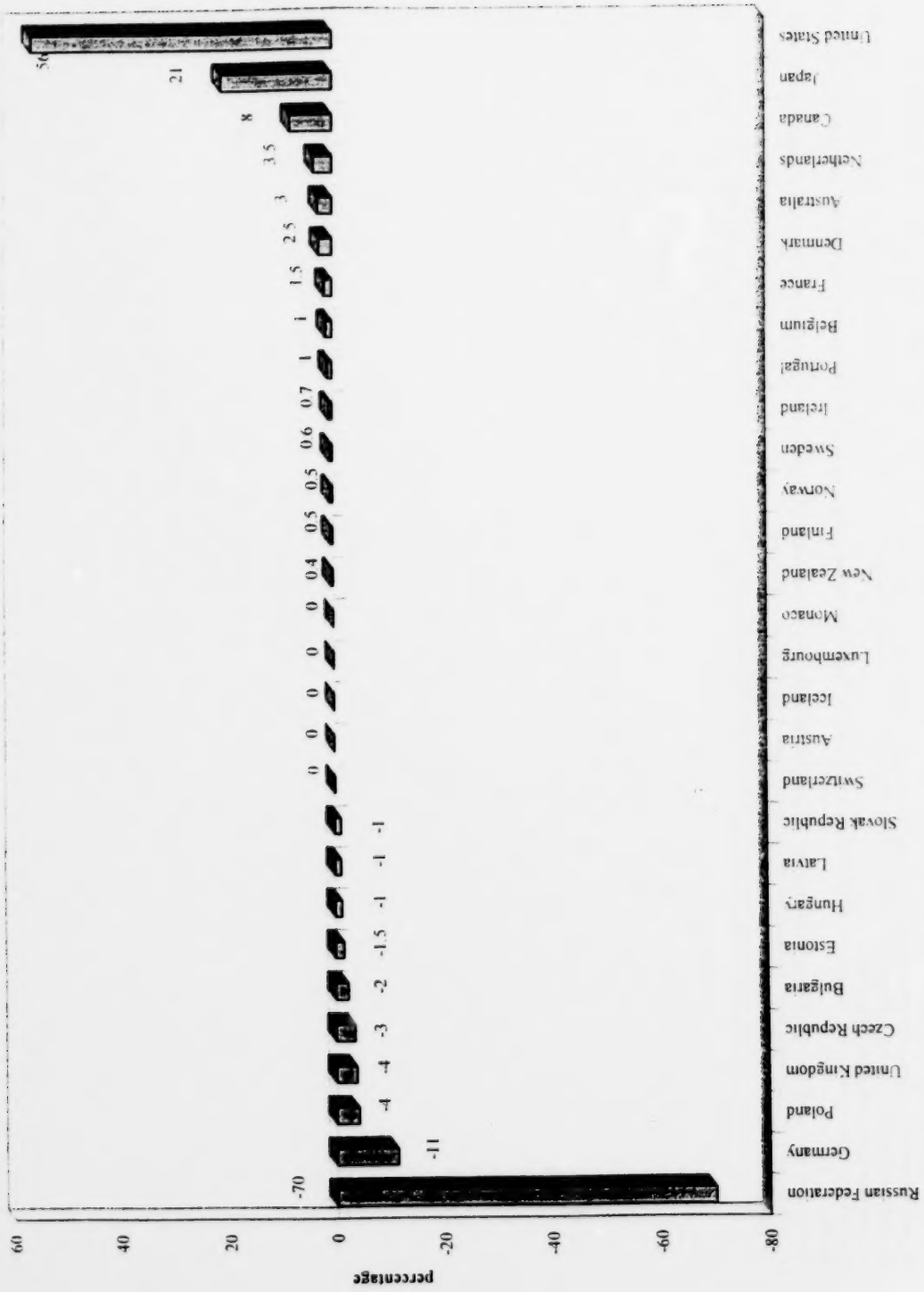



**Figure 1. Contributions of individual Parties into decrease or increase of total $CO_2$ emissions aggregated for all Annex I Parties in the period 1990-1995**

**Figure 2. Projected increase or decrease in $CO_2$ emissions in 2000 relative to 1990, Gg**